



## Revised Draft



# Habitat Restoration, Enhancement, Monitoring, and Management Program for the Cabrillo Bridge and Lower Mission Creek Projects

January 2011

Prepared For  
David Black and Associates



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**Habitat Restoration, Enhancement, Monitoring, and Management Program  
for the Cabrillo Bridge and Lower Mission Creek Projects**

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# 1.0 Introduction

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The Cabrillo Bridge Replacement Project (Project) is located near the confluence of Mission Creek with the Pacific Ocean in Santa Barbara, within the Mission Creek estuary. Mission Creek is perennial and has a drainage area of approximately 7,000 acres. While the creek is relatively degraded at the project location due to development and channelization, the intent of the Project, in addition to increasing the flow capacity of the creek, is to restore and/or enhance the creek banks to a more natural condition. These enhancements are intended to improve the overall natural environment and to improve habitat for fish species that inhabit the creek.

Flooding from lower Mission Creek is an issue being addressed by the Lower Mission Creek Flood Control Project that extends from Canon Perdido Street to Cabrillo Boulevard. The Project is one part of a larger project to improve the hydraulic conveyance of lower Mission Creek to the Pacific Ocean. The Project area (Figure 1) encompasses Mission Creek and its lagoon, from State Street to the beach as well as the immediately adjacent areas along the top of the creek banks where revegetation with native riparian plant species will occur. In addition, staging areas, areas where the temporary beachway is to be located, and areas where existing palm trees will be relocated and turf grass replanted are part of the overall Project area.

Existing non-native vegetation at the top of the banks between State Street and Cabrillo Boulevard will be removed during reconstruction of the creek banks in this area and will be replaced with native plants. The reconstructed banks from Cabrillo Boulevard to the beach will also be planted with native species to provide bank stabilization and to improve habitat for aquatic species in the enlarged lagoon.

This Plan addresses mitigation for impacts on wetland and transitional habitats for the Cabrillo Bridge Project and for the Lower Mission Creek Project, in part. It describes the existing conditions, goals and objectives for the restoration, methods for establishing and maintaining the plants (e.g., planting, irrigation, and weed control), performance criteria, monitoring and performance evaluation, remedial actions (if needed), and reporting.

## 2.0 Existing Conditions

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This general habitat description is based on information contained in the Initial Study (City of Santa Barbara 2007), a Natural Environment Study (URS 2006), and site reconnaissance surveys conducted by SAIC in July 2009 and Cardno ENTRIX in December 2010. A map with notes on existing vegetation and photopoints (as discussed below) is shown in Attachment A. No sensitive plant species have been observed in the treatment area.



Figure 1 : Approximate Restoration Area Planting Locations



The Project site is divided into three major areas for the purposes of this Plan: upstream between Cabrillo Boulevard and State Street, from Cabrillo Boulevard to 200 feet on the east bank and 100 feet on the west bank downstream, and the coastal lagoon to the ocean. These areas are referred to as the upstream planting area, the downstream planting area, and the lagoon planting area in this Plan. The upstream portion of the creek has wooden retaining wall on either side of the approximately 50-foot wide channel. Above the wooden retaining walls are bands of planted and naturalized vegetation that are about 15 to 20 feet wide. Vegetation in this area is almost entirely myoporum (*Myoporum laetum*), a non-native invasive species. The myoporum is low in stature (generally less than six feet in height) and overhangs the creek.

Downstream of Cabrillo Boulevard for approximately 100 to 200 feet the creek widens onto East Beach. Adjacent to the creek, near Cabrillo Boulevard, the banks are primarily covered in turf, mostly Bermuda grass (*Cynodon dactylon*) with scattered planted fan palm trees (*Washingtonia* spp.). Further south, the creek banks are have limited vegetation including dune scrub species, such as beach-bur (*Ambrosia chamissonis*) and sea rocket (*Cakile maritima*) as well as wetland transition species such as sedge (*Cyperus* sp.) and tamarisk (*Tamarix* sp.). Tamarisk is a non-native invasive species and is discussed in more detail below.

Further downstream, Mission Creek widens into the lower lagoon area. Vegetation along margins of the lagoon is limited due to sandy soil, and heavy human use of the adjacent beach area. Existing vegetation consists of patches of beach bur, sea rocket, and beach saltbush (*Atriplex leucophylla*).

The lagoon is dynamic and periodically breaks the sandbar during storm runoff events and empties into the Pacific Ocean. The lagoon supports a variety of fish and invertebrates which in turn provide forage for a variety of bird species. The lagoon varies in size from month to month and from year to year. The area surrounding the lagoon is primarily sandy beach habitat that has been degraded by trampling and various construction projects with landscaped areas (turf grass and palm trees) near Cabrillo Boulevard. See photographs in Attachment A for current conditions of the estuary.

## 3.0 Goals and Objectives of the Plan

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The purpose of this Plan is to provide the methodology to restore and enhance exposed ground disturbed by Cabrillo Bridge Project construction activities and removal of non-native plants, and to provide mitigation for impacts of the Lower Mission Creek Project along downstream lagoon areas. This Plan only addresses areas to be landscaped and/or restored with native vegetation. Other portions of the Project that will be planted with turf, palm trees, or other non-native species are handled separately in the landscape plans and specifications.

The goals of the restoration are (1) to establish native vegetation along the reconstructed banks of the lagoon, and (2) to enhance vegetation along the creek banks between State Street and Cabrillo Boulevard. This Plan contains the necessary procedures for establishment of self-sustaining native vegetation that is appropriate to the site, is aesthetically pleasing, and is free of

invasive non-native species. These objectives are provided in detail in section 9.0 Performance Evaluation

## 4.0 Implementation Schedule

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Slope stabilization is scheduled to be implemented in the summer and fall of 2012 with planting to begin as soon as work is complete. This schedule is subject to project delays of one year. Irrigation, weed control, and other maintenance will continue for at least five years or when all performance criteria are met, whichever is later.

## 5.0 Personnel

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This Plan refers to several stakeholders for this Project. They include:

- The City of Santa Barbara. The City is the lead agency for the Project and the primary point of contact for all aspects of the Project.
- The Restoration Biologist. The Restoration Biologist is a component of the Project Environmental Coordinator (PEC) consulting team to the City and will monitor, provide recommendations, and report on the status/success of the program, as required by various resource agencies.
- The Construction Contractor. The Construction Contractor is responsible for making sure that construction is completed as detailed in Project plans and specifications. He is also responsible for installation of plants with associated irrigation devices and development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), and compliance with Erosion Control Plan as shown on Project plans.
- Landscape Maintenance Sub-Contractor. A landscape sub-contractor will be responsible for maintaining the plantings and irrigation system until the Project is completed. At the City's discretion, the landscape sub-contractor may continue to maintain the Project site until performance criteria are met, or the City may elect to conduct the necessary maintenance.

## 6.0 Project Plans

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A complete set of Plans for the Project is available by request at the City. Components of those Plans applicable to restoration are discussed below.

## 6.1 Surface Stabilization and Sediment Control

Erosion and sediment control is an integral part of the Project, and both permanent and temporary Best Management Practices (BMPs) are included in the Project Plans. Temporary erosion control BMPs are required during the wet season (October 1 through April 30), and sediment control is required all year. Permanent erosion control in the form of vegetation is required in all areas disturbed by construction that will not be paved or covered with structures and on all slopes steeper than 10:1. Sediment control is required where water from Project activities would drain into sensitive areas or areas with existing vegetation. As mentioned above, a SWPPP will be prepared to address specific concerns regarding soil stabilization and runoff from the Project site.

Coconut fiber fabric/mats will be used in upstream and downstream Project planting areas to reduce soil loss after construction is complete, except where the brush mattress (described below) is required. On sloping areas, they will be tied in at the top of the slope and anchored as appropriate. In addition, subsurface rock and a brush mattress, as described below, will be installed on the banks downstream of Cabrillo Boulevard to reduce erosion. No special soil stabilization measures are planned for the lagoon planting area.

## 6.2 Planting Plan

To preserve the integrity of local plant gene pools, to ensure adaptation to site-specific conditions, and to avoid inadvertent introduction of inappropriate species or pathogens, all seed and plant materials (cuttings, etc.) to be used for revegetation will be native and have originated from the Santa Barbara area. Suggested locations for collection of cuttings and seed to use in propagation include: Santa Barbara Airport, Coal Oil Point Reserve, and University of California at Santa Barbara. Other locations in and near the City of Santa Barbara that are south of the crest of the Santa Ynez Mountains from Goleta to Carpinteria may be used as well. No horticultural varieties will be used.

If feasible, container plant installation will be planned for cooler, moister months (November through February). This will lessen stress to newly establishing plants. However, planting timing will be adjusted as necessary to accommodate Project schedules.

All container plantings will be installed in the manner described in the Project Plans. A hole two times the diameter of the rootball will be excavated. A gopher basket will be installed for root protection for each plant installed in the upstream planting area. The plant will be placed in the hole with the crown about one inch above grade. A fertilizer planting tablet will be placed on either side of the plant, and the hole will be backfilled, leaving a two inch temporary berm around the planting. Wire mesh protective fencing, four feet in height and painted green, will be installed around the planting area to prevent trampling and other damage, except where the fencing could be subject to tidal action or stream/lagoon flooding. The fencing will be removed when the performance criteria are met.

Container plantings will be installed on the banks both upstream and downstream. Each planting area consists of plantings on both sides of the creek. Project landscape plan pages showing the layout of these planting areas are included as Attachment B.

### 6.2.1 Upstream Planting Area

On the north side of the bridge, all non-native vegetation will be removed from the planting area as described below. Native species typical of coastal bluff scrub and a few species present in riparian habitats will be planted. See Table 1 for a complete list of plants that will be installed in this area. Locations for container plantings are provided on page LP-3 of the Project Plans and in Attachment B.

Table 1. Plant Species for Upstream Planting Area			
Scientific Name	Common Name	Size	Number
<i>Platanus racemosa</i>	California sycamore	1 gallon	1
<i>Atriplex lentiformis</i>	Brewer's saltbush	1 gallon	30
<i>Encelia californica</i>	California encelia	1 gallon	8
<i>Eriogonum parvifolium</i>	Seaside buckwheat	1 gallon	15
<i>Isocoma menziesii</i>	Menzies goldenbush	1 gallon	3
<i>Leymus condensatus</i>	Giant wild rye	1 gallon	29
<i>Limonium californica</i>	Coastal status	1 gallon	66
<i>Rhus integrifolia</i>	Lemonadeberry	1 gallon	14
<i>Rosa californica</i>	California wild rose	1 gallon	12
<i>Salix lasiolepis</i>	Arroyo willow	1 gallon	4
<i>Suaeda taxifolia</i>	Wooly sea-blite	1 gallon	25
Note: 1 * Pounds per acre assuming minimum pure live seed (PLS) based on seed laboratory tests. Actual poundage applied may be greater due to inclusion of non-live seed materials such as chaff that may be impractical to separate from the live seed.			

The planting palette for the upstream planting area was selected based on the likelihood that the species will thrive on the site and aesthetics. All species are native and grow in the Santa Barbara vicinity. The species are a combination of plants well suited to riparian areas and to coastal bluff scrub. These native species are expected to be self-sustaining and require little irrigation or other maintenance after the establishment period.

### 6.2.2 Downstream Planting Area

The downstream planting area will be installed in layers. Rock slope protection will be installed to an elevation of 8.8 feet above the mean high tide line. The rock slope protection will be covered with fill to the finished grade elevations contained in Project Plans, except where the brush mattress (described below) is to be installed. The entire slope will be covered with coconut fiber fabric/mat from the top of the slope to the creek bottom. Brush mattresses will be installed on the portion of the restoration between eight and ten feet in elevation as shown on the Project Plans. Brush mattresses will consist of the following elements:

- Coconut fiber mat with coconut fiber roll at base of slope.

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- Fascines placed parallel to the flowline and staked in place in rows approximately three feet apart. Fascines are eight- to ten-inch diameter bundles of mulefat stakes four to six feet in length tied with twine.
- Loose mulefat cuttings, one half to one inch in diameter, placed on the slope perpendicular to the flow line. A network of wooden stakes and live mulefat stakes held together with twine will hold the brush mattress to the slope.
- Fill to cover the mulefat and leave three to four inches of brush mattress stakes exposed.

Following placement of erosion control described above, a concrete curb will be installed on the west side of the creek to separate the turf grass from the native plantings. The curb will be four inches wide and eight inches tall, recessed six and a half inches into the ground. After installation of the curb, the landscape plantings will be installed. Due to past alteration of the soils for various improvements, the soils may not be consistent with naturally occurring habitats of similar water regime and proximity to the ocean. For that reason, the plantings specified in this Plan are varied such that the best adapted plants will be expected to thrive. This restoration plan includes four zones of planting:

- Coastal dune scrub on the upper slope between ten and 13.5 feet in elevation.
- Riparian scrub on the upper mid slope between eight and ten feet in elevation.
- Transitional wetlands on the lower mid slope between six and 8.6 feet in elevation.
- Emergent wetlands on the lower mid slope between five to seven feet in elevation.

Some of the elevation ranges for the different zones overlap somewhat to allow blending of the habitats. Plants to be installed for the different zones of the downstream planting areas are presented in Tables 2 through 5. This planting palette may be adjusted by the Restoration Biologist as necessary to accommodate field conditions. Any changes or substitutions will be grown from stock from the same collecting area described above.

**Table 2. Downstream Planting Area: Coastal Dune Scrub**

Scientific Name	Common Name	Size	Number
<i>Abronia umbellata</i> ssp. <i>umbellata</i>	Purple sand verberna	1 gallon	36
<i>Ambrosia chamissonis</i>	Beach bur	1 gallon	37
<i>Atriplex lentiformis</i>	Saltbush	1 gallon	37
<i>Atriplex leucophylla</i>	Beach saltbush	1 gallon	36
<i>Calystegia soldanella</i>	Dune morning glory	1 gallon	37
<i>Camissonia cheiranthifolia</i>	Beach evening primrose	1 gallon	67
<i>Distichlis spicata</i>	Saltgrass	1 gallon	67
<i>Eriogonum parvifolium</i>	Coastal buckwheat	1 gallon	37
<i>Isocoma menziesii</i> var. <i>vernonioides</i>	Coastal goldenbush	1 gallon	37
<i>Leymus condensatus</i>	Giant wild rye	1 gallon	38

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**Table 3. Downstream Planting Area: Riparian Scrub and Mulefat Mattress**

Scientific Name	Common Name	Size	Number
<i>Artemisia douglasiana</i>	Mugwort	1 gallon	9
<i>Atriplex watsonii</i>	Watson's saltbush	1 gallon	8
<i>Baccharis douglasii</i>	Marsh baccharis	1 gallon	9
<i>Baccharis salicifolia</i>	Mulefat	Cuttings	
<i>Distichlis spicata</i>	Saltgrass	1 gallon	9
<i>Isocoma menziesii</i> var. <i>vernonioides</i>	Coastal goldenbush	1 gallon	9
<i>Leymus triticoides</i>	Blue wild rye	1 gallon	10

**Table 4. Downstream Planting Area: Transitional Wetlands**

Scientific Name	Common Name	Size	Number
<i>Arthrocnemum subterminale</i>	Pariah's glasswort	1 gallon	52
<i>Atriplex californica</i>	Saltbush	1 gallon	52
<i>Cressa truxillensis</i> var. <i>truxillensis</i>	Alkali weed	1 gallon	52
<i>Distichlis spicata</i>	Saltgrass	1 gallon	77
<i>Euthamia occidentalis</i>	Western goldentop	1 gallon	28
<i>Frankenia salina</i>	Alkali heath	1 gallon	78
<i>Jaumea carnosa</i>	Jaumea	1 gallon	53
<i>Juncus patens</i>	Common rush	1 gallon	53
<i>Malvella leprosa</i>	Alkali mallow	1 gallon	53
<i>Monanthochloe littoralis</i>	Shoregrass	1 gallon	53
<i>Salicornia virginica</i>	Pickleweed	1 gallon	78
<i>Suaeda taxifolia</i>	Wooly sea-blite	1 gallon	47

**Table 5. Downstream Planting Area: Emergent Wetlands**

Scientific Name	Common Name	Size	Number
<i>Jaumea carnosa</i>	Jaumea	1 gallon	150
<i>Scirpus maritimus</i>	Seaside bulrush	1 gallon	200
<i>Scirpus robustus</i>	Sturdy bulrush	1 gallon	200
<i>Salicornia virginica</i>	Pickleweed	1 gallon	215

Note:

1 \* Pounds per acre assuming minimum pure live seed (PLS) based on seed laboratory tests. Actual poundage applied may be greater due to inclusion of non-live seed materials such as chaff that may be impractical to separate from the live seed.

### **6.2.3 Lagoon Planting Area**

The lagoon planting area was designed to blend with the downstream planting area. The planting palette is similar, and layout of the plantings will be determined in the field to maximize the continuity of the project. Although the lagoon margins change based on creek outflows, tides,

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and storm surges, no grading of the project site is anticipated, and the natural lagoon configuration will not be altered. However, prior to planting, topography in the coastal dunes planting area will be “micro-graded” to create natural-looking dune hummocks of 24 inches in height.

Container plantings will be installed as described above, shown on detailed plans, and listed in Tables 6 through 9, below. In addition to container plantings, seed will be distributed on site in the fall following installation of container plantings. Seed will be hand-broadcast and raked in to a depth of 0.25 inch. The seed mix is provided in Table 10.

Due to the dynamic nature of the lagoon environment, the plantings specified in this Plan are varied such that the best adapted plants will be expected to thrive. This restoration plan includes four zones of planting:

- Coastal dune scrub on the upper slope between ten and 13.5 feet in elevation.
- Riparian scrub on the upper mid slope between eight and ten feet in elevation.
- Transitional wetlands on the lower mid slope between six and 8.6 feet in elevation.
- Emergent wetlands on the lower mid slope between five to seven feet in elevation.

Some of the elevation ranges for the different zones overlap somewhat to allow blending of the habitats. Plants to be installed for the different zones of the downstream planting areas are presented in Tables 2 through 5. This planting palette may be adjusted by the Restoration Biologist as necessary to accommodate field conditions. Any changes or substitutions will be grown from stock from the same collecting area described above.

Table 6. Lagoon Planting Area: Coastal Dune Scrub			
Scientific Name	Common Name	Size	Number
<i>Abronia umbellata ssp. umbellata</i>	Purple sand verberna	1 gallon	92
<i>Ambrosia chamissonis</i>	Beach bur	1 gallon	93
<i>Atriplex lentiformis</i>	Saltbush	1 gallon	61
<i>Atriplex leucophylla</i>	Beach saltbush	1 gallon	92
<i>Calystegia soldanella</i>	Dune morning glory	1 gallon	31
<i>Camissonia cheiranthifolia</i>	Beach evening primrose	1 gallon	93
<i>Distichlis spicata</i>	Saltgrass	1 gallon	61
<i>Eriogonum parvifolium</i>	Coastal buckwheat	1 gallon	30
<i>Isocoma menziesii var. vernonioides</i>	Coastal goldenbush	1 gallon	60

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**Table 7. Lagoon Planting Area: Riparian Scrub**

Scientific Name	Common Name	Size	Number
<i>Artemisia douglasiana</i>	Mugwort	1 gallon	103
<i>Baccharis douglasii</i>	Marsh baccharis	1 gallon	82
<i>Baccharis salicifolia</i>	Mulefat	Cuttings	20
<i>Distichlis spicata</i>	Saltgrass	1 gallon	125
<i>Isocoma menziesii</i> var. <i>vernoioides</i>	Coastal goldenbush	1 gallon	40
<i>Leymus triticoides</i>	Blue wild rye	1 gallon	40

**Table 8. Lagoon Planting Area: Transitional Wetlands**

Scientific Name	Common Name	Size	Number
<i>Atriplex californica</i>	Saltbush	1 gallon	203
<i>Cressa truxillensis</i> var. <i>truxillensis</i>	Alkali weed	1 gallon	101
<i>Distichlis spicata</i>	Saltgrass	1 gallon	405
<i>Frankenia salina</i>	Alkali heath	1 gallon	405
<i>Jaumea carnosa</i>	Jaumea	1 gallon	203
<i>Monanthochloe littoralis</i>	Shoregrass	1 gallon	101
<i>Salicornia virginica</i>	Pickleweed	1 gallon	405
<i>Suaeda taxifolia</i>	Wooly sea-blite	1 gallon	203

**Table 9. Lagoon Planting Area: Emergent Wetlands**

Scientific Name	Common Name	Size	Number
<i>Jaumea carnosa</i>	Jaumea	1 gallon	256
<i>Scirpus maritimus</i>	Seaside bulrush	1 gallon	385
<i>Scirpus robustus</i>	Sturdy bulrush	1 gallon	256
<i>Salicornia virginica</i>	Pickleweed	1 gallon	385

**Table 10. Lagoon Planting Area: Seed Mix**

Scientific Name	Common Name	Quantity (PLS lbs/acre)
<i>Abronia maritima</i>	Red sand verbena	1
<i>Abronia umbellata</i>	Pink sand verbena	1
<i>Ambrosia chamissonis</i>	Beach bur	4
<i>Calystegia soldanella</i>	Dune morning glory	0.5
<i>Camissonia cheiranthifolia</i>	Beach evening primrose	4
<i>Escholtzia californica</i> var. <i>maritima</i>	California poppy	3
PLS lbs/ acre is pure live seed pounds per acre that the seed is applied. To attain this, th amount of seed is increased to account for impurities.		



### 6.3 Irrigation

Irrigation systems will be installed as shown on the Project Plans. In the upstream planting area, a drip system will be installed with one one-gallon per hour emitter per planting. A diagrammatic plan for the layout of the irrigation piping is provided in the Project Plans. Actual layout of the piping will be determined based on the layout of the plantings.

A sprinkler system will be installed at the downstream and lagoon planting area. It will consist of sprinkler heads with five on the west side of the creek and ten east side of the creek. Sprinkler heads will be “pop-up” type, meaning they will be flush to the ground when not in use and pop up to 12 inches in height when in use.

Irrigation systems will be maintained for two complete summers, unless container plants overgrow the sprinklers in that time. When irrigation is discontinued, container plantings should be able to survive without additional irrigation. However, if irrigation is extended beyond two years during normal or wet years, the monitoring program will be extended for an equal length of time to ensure survival of the restoration site for three years without water. If conditions are unusually dry (defined as 80 percent or less than average) during any month between October and March of the monitoring period, supplemental irrigation may be used the following month without extending the monitoring program.

### 6.4 Replacement Plants

Because Project soils have been altered by various improvements in the past, survivorship of the plantings is difficult to predict. For this reason, a large number of species and plant types (e.g. spreading grasses and herbs in addition to erect shrubs) are planned for the different planting areas, especially in the downstream planting area. If survival and/or cover have met minimum criteria by the third year, replacement plants will be installed, or other action will be taken to improve survivorship. Replacement plants may not be the same species that perished. Rather, the Restoration Biologist will determine which species are best suited at the locations needed. Replacement plants are not limited to the existing plant palette, but will be native species that are subject to the same collection area restriction described above.

### 6.5 Removal of Pests

Gophers, ground squirrels, voles, rats, and other rodents could damage the habitat restoration plantings and/or irrigation system and cause a nuisance at the Project site. However, due to the sensitivity of the habitat, rodenticides containing any anticoagulant compounds (including, but not limited to, Warfarin, Brodifacoum, Bromadiolone, or Diphacinone) shall not be used.

### 6.6 Removal of Invasive Non-Native Species

Prior to construction in the upstream portion of the Project (north of Cabrillo Bridge) non-native invasive species, primarily myoporum (*Myoporum laetum*), will be removed. This species currently occupies all of the natural soil on the banks of the creek and overhangs the creek, dropping leaves and seeds into the estuary. All plants will be pulled or dug out to remove the

roots. This will require heavy equipment, as the existing vegetation is mature. Following the removal of weeds, the site will be heavily watered to a depth of at least 12 inches. After a minimum of ten days, a second weed removal event will occur. The second weed removal event will be conducted only by hand, in compliance with conditions from the California Coastal Commission.

Non-native invasive species will be removed from the entire native planting areas of the Project. The treatment area will be maintained relatively free of invasive species for the entire five-year monitoring period. For the purposes of this Plan, non-native invasive species are defined as species that may invade native habitats and inhibit or preclude the establishment of native plants in that area. Removal will focus on plants rated as a high threat by the California Invasive Plant Council (CIPC), and other species identified as problematic by the Restoration Biologist on the particular site under consideration. Common and widespread non-native species, such as annual grasses, will not be targeted for removal.

A preliminary list of target species is provided in Table 11. This list includes all non-native invasive species that are currently present on or near the Project site. In addition, Table 11 includes those invasive species that are common in the Goleta/Santa Barbara/Carpinteria wetlands and dunes in similar habitats that could be introduced by increased human presence on the Project site. In other words, the list in Table 11 represents those species that are considered probable to occur on the Project site. Removal is not limited to the species in Table 11, but this list will serve as a starting point for determining species for removal and will be augmented by the Restoration Biologist if other invasive species are found during monitoring.

Priority for weed removal will be placed on particularly problematic invaders (e.g., pampas grass [*Cortaderia* spp.]). This group includes mostly perennial species, but also includes certain annual species that can invade undisturbed native habitat (such as yellow star-thistle [*Centaurea solstitialis*]). Other species that are invasive, such as black mustard (*Brassica nigra*) and milk thistle (*Silybum marianum*), will be removed as well.

Individual invasive exotic plants will be removed by a variety of methods, depending on the size of the problem, tools that are readily at hand, sensitivity of the site, and preference/experience of the contractor. Preliminary methods for each species are provided in Table 11 but will be refined based on site conditions. Methods will include hand removal (pulling, hoeing, etc.) and treatment with herbicide. Use of herbicides for this Project is highly restricted, as described in more detail below. However, most non-native invasive species can be removed by hand if the infestation is addressed early. For that reason, monitoring and maintenance need to be conducted in a timely manner.

Generally, small infestations will be removed by hand by the restoration monitor during monitoring and larger infestations will be removed by a landscaper or other specialist. The City of Santa Barbara has strict policies on the use of herbicides and these policies will be strictly followed for the duration of the Project. In addition, requirements from the California Coastal Commission specify that no herbicides will be used within the wetland creek habitat (i.e., all herbicide use is restricted to uplands and the wetland transition areas). Herbicide use will be restricted to Glyphosate Aquamaster (previously Rodeo) and will be limited to hand painting on cut stems. No spraying will be permitted. Further restrictions on herbicide use include:

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- Limited to non-rainy season (1 April to 31 October).
- Not permitted in wind speeds exceeding 5 m.p.h.
- Not permitted within 48 hours of predicted rain.
- Not permitted within 72 hours after rain.

All herbicide use will be conducted with the recommendation of a Pest Control Advisor and all restrictions on the product labeling will be strictly followed. Weed pieces containing material that could reestablish on site (e.g., seeds of tree tobacco or sections of cape ivy) will be removed from the site in plastic bags and disposed of appropriately.

Table 11 will be updated throughout the Project, and the city will continue to remove non-native invasive species for the life of the Project, as required by the California Coastal Commission.

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Table 11. Preliminary List of Invasive Exotic Species for Removal				
Scientific Name/ Common name	Priority	Present on or near Site	Timing and methods for removal*	Comments
<i>Arundo donax</i> / Arundo or giant reed	Very High	No	Anytime 1. Dig up entire plant (may require several attempts to be effective) 2. Cut stems and paint with herbicide	Highly invasive species of riparian systems throughout southern California.
<i>Asphodelus fistulosus</i> / Onionweed	High	No	Spring is preferred timing 1. Dig up plant and dispose offsite. 2. Spot spray with herbicide (glyphosate or similar)	Typically occurs in ruderal areas (e.g., roadsides) but can spread into adjacent undisturbed habitat, coastal scrub. Could easily spread offsite.
<i>Brassica nigra</i> / Black mustard	Moderate	No	Timing should be prior to seed maturation (March/April) 1. Hand pull individual plants 2. Cut plants to within three inches of the ground (may require several treatments in the spring)	Tends to establish in disturbed sites and spreads easily into open habitats.
<i>Carpobrotus edulis</i> / Hottentot fig	High	Yes	Anytime 1. Pull seedlings. 2. Treat with herbicide (glyphosate)	Establishes in disturbed areas and can spread into relative undisturbed areas, including dune systems. Present east of the site.
<i>Centaurea solstitialis</i> / Yellow star-thistle	High	No	Timing can be anytime after plants come up, but before seed matures (March-May) 1. Dig up or pull plant and dispose offsite. 2. Cut above-ground parts of plant and haul offsite (may require several treatments)	Establishes in disturbed areas and can spread into relative undisturbed areas.
<i>Conium maculatum</i> / Poison hemlock	Moderate	No	Spring/Summer 1. Pull young plants 2. Cut flowering stalks (such as with a weed whacker) prior to formation of seed. Will require multiple treatments per season and for multiple seasons	Biennial. Cutting is effective for removal, but must be conducted for more than one year.

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**Table 11. Preliminary List of Invasive Exotic Species for Removal**

Scientific Name/ Common name	Priority	Present on or near Site	Timing and methods for removal*	Comments
<i>Cortaderia</i> spp./ Pampas grass; jubata grass	Very High	No	Anytime 1. Dig up plant and dispose offsite 2. Spot spray with herbicide (glyphosate or similar)	Large, aggressive weed that establishes in small open areas and spreads. Can cover large areas and degrade otherwise undisturbed habitats.
<i>Cynodon dactylon</i> / Bermuda grass	Moderate	Yes, turf grass on and adjacent to downstream planting areas	Anytime, but best in late spring 1. Pull and remove all material from site	This species will come up in the treatment area and need to be removed frequently for the life of the Project.
<i>Delairea odorata</i> / Cape ivy	Very High	No	Anytime. 2. Remove above ground parts several times a year 3. Treat resprout with herbicide	Highly invasive species of riparian systems. Known from many locations in the Santa Barbara foothills. Can establish from a short (two-inch) section of plant.
<i>Foeniculum vulgare</i> / Sweet fennel	High	No	Anytime 1. Pull seedlings (must get root) 2. Dig up larger plants	Highly persistent in a variety of habitats. May not respond well to herbicide. Hand removal recommended.
<i>Hirschfeldia incana</i> / Mediterranean mustard	Moderate	No	Timing should be prior to seed maturation (March/April) 1. Hand pull individual plants 2. Cut plants to within three inches of the ground (may require several treatments in the spring)	Somewhat invasive species. Generally requires a disturbed area for establishment and will not invade undisturbed habitats.
<i>Marrubium vulgare</i> / Horehound	High	No	Anytime 1. Dig up plant and dispose offsite. 2. Pull seedlings	Moderate invader, particularly long roadsides. Will creep into native undisturbed areas.
<i>Myoporum laetum</i> / Myoporum	Very High	Yes, the upstream planting areas are currently this species	Anytime 1. Pull up seedlings 2. Dig up larger plants	Moderate invader, expected to come up in upstream planting areas due to amount of seed currently in the soil.
<i>Nicotiana glauca</i> / Tree tobacco	High	No	Anytime 1. Dig up plant. 2. Spot spray with herbicide (glyphosate or similar)	Establishes well in disturbed areas and then spreads and takes hold in small disturbed areas, such as on eroding slopes.

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Table 11. Preliminary List of Invasive Exotic Species for Removal				
Scientific Name/ Common name	Priority	Present on or near Site	Timing and methods for removal*	Comments
<i>Pennisetum clandestinum</i> / Kikuyu grass	Very High	Yes, downstream of the treatment area	Anytime 1. Dig up and/or pull any plants observed.	
<i>Pennisetum setaceum</i> / Fountain grass	Very High	No	Anytime 1. Dig up plant and dispose offsite. 2. Spot spray with herbicide (glyphosate or similar)	Establishes quickly along roadsides and once established, spreads into adjacent or nearby undisturbed areas. Can prevent establishment of native species.
<i>Piptatherum miliaceum</i> / Smilo grass	High	No	Springtime is preferred 1. Dig up plant and dispose offsite. Spot spray with herbicide (glyphosate or similar)	Establishes along roadsides and spreads into adjacent habitat.
<i>Ricinus communis</i> / Castor bean	High	No	Anytime 1. Pull seedlings 2. Dig out larger plants	Seeds of the castor bean are highly toxic and the foliage can irritate skin and eyes.
<i>Silybum marianum</i> / Milk thistle	Moderate	No	Timing should be prior to seed maturation (March/April) 1. Hand pull individual plants 2. Cut plants to within three inches of the ground (may require several treatments in the spring)	Tends to establish in disturbed sites and spreads easily into open habitats. Not likely to invade undisturbed habitat.
<i>Tamarix</i> spp./ Tamarisk	High	Yes, one sapling observed a short distance downstream	Anytime 1. Hand pull plant and dispose of any flowering or fruiting material offsite 2. Dig up larger plants 3. Cut plant and paint cut stem immediately with herbicide	Aggressive invasive species in riparian and wetland habitats
<i>Xanthium strumarium</i> / Cocklebur	Moderate	Yes, lots of plants downstream of Project	Spring/Summer 1. Pull seedlings and small plants 2. Cut larger plants at the base 3. Cut and bag all maturing seed pods and dispose offsite	Problematic, particularly at the early stages of restoration.
Note: * herbicide use limited to restrictions described above.				

## 7.0 Monitoring and Maintenance

After construction and prior to planting, a survey of the treatment area will be conducted by the Restoration Biologist to inspect the integrity of the soil surface and to ensure that erosion control methods (e.g. coconut fiber blanket) and irrigation systems are in place. After planting, the objectives of monitoring will be to document establishment and growth of planted species, to identify the need for maintenance (including repair of irrigation systems), and to identify incipient weed problems. Incipient weed problems are defined as establishment in the treatment area of invasive non-native species not abundant in adjacent areas that might, by establishment in the treatment area, interfere with revegetation by native species or threaten to invade adjacent undisturbed habitats. Maintenance will be conducted as necessary to ensure that revegetation goals can met in a timely manner.

Monitoring visits will be conducted following installation of container plantings for five years or longer, if necessary to meet the performance criteria. During the year following planting, subsequent monitoring will be scheduled by the Restoration Biologist based on timing of heavy rainfall events and progression of spring annuals as it pertains to the establishment of non-native invasive species. A general schedule for monitoring visits is provided in Table 12. The need for additional visits will be determined by the Restoration Biologist as necessary to detect and correct erosion following significant rainstorms. The purpose of monitoring visits will be to document and provide recommendations for weed control and/or erosion control. Photopoints will be taken in April and September. Fall monitoring will also include documentation of establishment of native perennial vegetation and quantitative monitoring of individual plantings, if feasible.

Table 12. Approximate Schedule for Monitoring Visits

Type of Monitoring	Timing				
	Year 1 (2012/2013)*	Year 2 (2014)	Year 3 (2015)	Year 4 (2016)	Year 5 (2017)
General walk-through of planting area to determine maintenance needs	Every two weeks following completion of construction	Jan/Feb/ Apr/Jun/ Nov	Mar/May	Mar/May	Mar/May
Photopoints	Apr/Sept	Apr/Sept	Apr/Sept	Apr/Sept	Apr/Sept
Detailed quantitative sampling	Sept	Sept	Sept	Sept	Sept

\* Date may be subject to one year project delay

Once weed infestations and erosion appear to be under control, monitoring may be reduced to once in the spring and once in the fall. This schedule is preliminary and may be modified by the Restoration Biologist, as necessary to meet Project objectives.

Container planting will generally be installed following completion of construction and monitoring will begin during that growing season. For this reason, 2013 is generally assumed to be the first year of the restoration monitoring effort. This schedule may be modified by the

Restoration Biologist as necessary, depending on site-specific conditions and changes in Project schedule. In addition, while minor maintenance can be accomplished during monitoring, major maintenance efforts (such as erosion and weed control, supplemental irrigation, or replanting, etc.) will be scheduled, as necessary.

Whenever the performance criteria (see below) are not met or when monitoring indicates that additional erosion control or weed control actions are necessary, the Restoration Biologist in consultation with the City of Santa Barbara will determine what measures are required and make sure that they are implemented.

## **8.0 Remedial Measures**

Following each monitoring visit, the Restoration Biologist will inform the City of Santa Barbara in writing of important observations and any problems observed. Recommendations will be provided, including timing for implementation. Timing will be critical for some problems, such as for failure of irrigation systems and removal of some invasive exotic species. Timing will be less critical for other problems, such as a need for replacement plants.

## **9.0 Performance Evaluation**

The performance evaluation will be based on meeting specific criteria within a specific timeframe. The purpose of the performance evaluation is to provide an objective measure of Project success. The discussion below is divided into general criteria that all areas must meet and also specific criteria for each sub area of the Project. In addition, some of the criteria have milestones for progress at different stages of the Project.

General:

- Following planting, the landscape contractor must meet the following basic survival milestones:
  1. 100 percent survival of container plantings at one month.
  2. 85 percent survival of container plantings at 90 days.
  3. No invasive non-native species present on the Project site at 90 days.
- No single species accounts for more than 50 percent of the total cover at the end of the monitoring program.
- No high priority or woody non-native invasive species are present on the Project site at the completion of the monitoring program.
- Cover of all non-native invasive species does not exceed five percent total cover.
- A given treatment area has been monitored for a minimum of five years at completion of the monitoring program and plantings have survived for a minimum of three years without supplemental irrigation, except as provided above.



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Upstream Planting Area:

- Survival is at least 70 percent three years after planting and 60 percent overall at the end of the monitoring period. If survival is difficult to determine, cover of 60 percent, as determined by sampling representative line-intercept transects, may be used instead at the end of the five-year monitoring period.
- No bare patches exceeding one meter in diameter are present.

Downstream Planting Area, Coastal Dune Scrub:

- Cover by native shrubs is at least ten percent three years after planting and 20 percent at the end of the monitoring period. Cover by all native species, including native shrubs, is at least 25 percent three years after planting and 50 percent at the end of the monitoring period.
- No bare patches exceeding one meter in diameter are present.

Downstream Planting Area, Riparian Scrub and Mulefat Mattress and Transitional Wetlands:

- Cover by all native species is at least 35 percent three years after planting and 70 percent at the end of the monitoring period.
- No bare patches exceeding one meter in diameter are present.

Downstream Planting Area, Emergent Wetlands:

- Cover by all native species is at least 30 percent three years after planting and 60 percent at the end of the monitoring period.

Lagoon Planting Area, Coastal Dune Scrub:

- Cover by native shrubs is at least five percent three years after planting and ten percent at the end of the monitoring period. Cover by all native species, including native shrubs, is at least 15 percent three years after planting and 30 percent at the end of the monitoring period.
- No bare patches exceeding one meter in diameter are present.

Lagoon Planting Area, Riparian Scrub and Transitional Wetlands:

- Cover by all native species is at least 25 percent three years after planting and 50 percent at the end of the monitoring period.
- No bare patches exceeding one meter in diameter are present.

Lagoon Planting Area, Emergent Wetlands:

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- Cover by all native species is at least 30 percent three years after planting and 60 percent at the end of the monitoring period.

If the performance criteria are not met at the end of the five-year program, a revised or supplemental restoration program will be prepared within 90 days to compensate for those portions of the original program that did not meet the approved performance criteria. The revised program will be processed as an amendment to the coastal development permit.

## **10.0 Reporting**

A report detailing the installation of the habitat restoration will be prepared and submitted to the City of Santa Barbara and the California Coastal Commission within 30 days of completion to document the “as built” condition. In addition, the report will include a discussion on any problems noted during implementation and resolution to those problems, a discussion on timing, any deviations from Project Plans, and at least two photographs.

For restoration monitoring, a summary annual report will be prepared to describe monitoring conducted, any weed control or other maintenance (e.g., watering) performed, problems noted and how resolved, and progress towards meeting the performance criteria. The report will include recommendations for remedial measures that may be necessary to achieve Project performance criteria and at least two photographs. Each report will be cumulative and summarize the results of previous reports. No further reporting will be necessary once the performance criteria are met and the plants have been installed for at least five years. The restoration monitoring reports will be submitted to the City of Santa Barbara, California Department of Fish and Game, and California Coastal Commission no later than January 30, covering the previous calendar year.

## Appendix A





Photopoints and Pre-project Vegetation Notes



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<b>Photo Point</b>	<b>1</b>	<b>Location</b>	At southwest corner of Rusty's Pizza, adjacent to Cabrillo Boulevard.	
<b>Direction:</b> 275  <b>Lens Size</b> 18 mm			<b>Direction:</b> 275  <b>Lens Size</b> 18 mm	
<b>Photo Point</b>	<b>2</b>	<b>Location</b>	Approximately 25 feet south of property line at northeast side of State Street bridge	
<b>Direction:</b> 73  <b>Lens Size</b> 18 mm			<b>Direction:</b> 50  <b>Lens Size</b> 18 mm	
<b>Direction:</b> 96  <b>Lens Size</b> 18 mm				
<b>Photo Point</b>	<b>3</b>	<b>Location</b>	Immediately below circular accent on west wall of Rusty's.	
<b>Direction:</b> 204  <b>Lens Size</b> 18 mm			<b>Direction:</b> 224  <b>Lens Size</b> 18 mm	



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<b>Photo Point</b>	<b>4</b>	<b>Location</b>	Approximately 25 feet west of bird guard on dredge pipe crossing Mission Creek	
<b>Direction:</b> 324  <b>Lens Size</b> 18 mm			<b>Direction:</b> 306  <b>Lens Size</b> 55 mm	
<b>Direction:</b> 348  <b>Lens Size</b> 55 mm			<b>Direction:</b> 10  <b>Lens Size</b> 18 mm	
<b>Photo Point</b>	<b>5</b>	<b>Location</b>	At new palm transplant location.	
<b>Direction:</b> 24  <b>Lens Size</b> 18 mm				
<b>Photo Point</b>	<b>6</b>	<b>Location</b>	From center of existing bike bridge	
<b>Direction:</b> 156  <b>Lens Size</b> 18 mm			<b>Direction:</b> 71  <b>Lens Size</b> 18 mm	

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<b>Photo Point</b>	<b>7</b>	<b>Location</b>	From existing young palm on east bank	
<b>Direction:</b> 281  <b>Lens Size</b> 18 mm			<b>Direction:</b> 230  <b>Lens Size</b> 18 mm	
<b>Photo Point</b>	<b>8</b>	<b>Location</b>	From 25 feet east of the bird guard on the pipe crossing the lagoon	
<b>Direction:</b> 115  <b>Lens Size</b> 18 mm				
<b>Photo Point</b>	<b>9</b>	<b>Location</b>	From the southwest corner of the skate park	
<b>Direction:</b> 175  <b>Lens Size</b> 18 mm			<b>Direction:</b> 215  <b>Lens Size</b> 18 mm	



## Appendix B

# Landscape Plan

